

tinuous, vitreous, showing under the microscope the concentric growth-markings, broadly expanded except in the parietal region, where it is considerably contracted, not reflexed, circumference ovate; aperture circular, set well to the left of the axis of the shell; operculum thin, corneous, yellowish white, paucispiral, with central raised nucleus.

Alt. 2.5, diam. maj. 1.25 mm.

Hab. Stockyard Creek, Norfolk Island (*R. Bell*).

Palaina belli, sp. n.

Shell small, sinistral, roughly ovate, dull white shading to pale flesh-colour, with reddish-brown apex; whorls 5, convex, the first two small, the third proportionately large, the remainder regularly increasing, the two apical whorls quite smooth, the remainder sculptured with closely set, wavy, spiral striæ which become considerably coarser on the last whorl, crossed by not very erect, rather oblique, transverse costulæ; suture deeply impressed; umbilicus narrow, deep; labrum continuous, outwardly expanded, sublaminiferous, circular; aperture large for the size of the shell, subcircular.

Alt. 3.5, diam. maj. 1.75 (nearly) mm.

Hab. Mount Pitt, Norfolk Island (*R. Bell*).

Differing from the preceding chiefly in its smaller size, it having one whorl less, in the more closely set and less erect and blade-like costulæ, coarser spiral striæ, the circular circumference of the labrum, and in the comparatively large size and more central position of the aperture with regard to the axis of the shell.

LXVI.—*Five new Siphonaptera from Asiatic Russia, collected by W. Rückbeil.* By the Hon. N. CHARLES ROTHSCHILD, M.A.

[Plates XIV. & XV.]

ONE of the two species described below belongs to the genus which we call *Ctenophthalmus*, Kolen. We dealt with this generic name at some length in Nov. Zool. 1911, p. 80, and came to the conclusion that its type is a species with three genal spines. A. C. Oudemans, in a recent note on Siphonaptera (Entom. Berichten, 1913, p. 341), maintains, on the contrary, that *musculi* is the type. He says:—"The genus *Ctenophthalmus* is well defined by Kolenati by the words

‘hat vor den Oellen kleine bewegliche Ctenidien.’” The only European species of flea, Oudemans continues, which conforms to this definition is *musculi*, Dugès. Oudemans, it will be noticed, identifies (without further consideration) the “movable ctenidia” mentioned by Kolenati with the spine-like frontal bristles found in *musculi* and allies, *i. e.* in the genus which we call *Leptopsylla*. These frontal bristles, however, are by no means the ctenidia of Kolenati’s description of *Ctenophthalmus*. The list of species which Kolenati gives as belonging to *Ctenophthalmus* proves that the “movable ctenidia in front of the ocelli” are nothing else but the genal ctenidia, which are present in all the species Kolenati mentions, while the frontal spiniform bristles are found only in the one species to which he refers as *talpæ*. Moreover, the whole context shows clearly that *Ctenophthalmus* was meant to comprise all the species with pronotal and genal combs. It was, in fact, a composite genus with a very general definition, and without any fixation of a type. We go even further, maintaining that Kolenati did not know of the existence of the spiniform frontal bristles of *musculi*, Dugès. He does not mention them anywhere, nor are they indicated in the figure which he gives of *musculi* (1863). We consider, therefore, Oudemans’ action as being based on an erroneous premise, and shall continue to use, as did Kolenati in his later papers, the name *Ctenophthalmus* for *bisocotodentatus* and allies.

It may be mentioned in passing that Oudemans is also in error when stating that *musculi* is the only European species with “movable ctenidia in front of the eyes” in Oudemans’ sense. There are several such species in Europe, one of which (*bidentatus*, Kolen., = *monocnemus*, Kolen., = *sobrinus*, Roths.) was already known to Kolenati besides *musculi*.

1. *Ctenophthalmus dolichus*, sp. n.

(Pl. XIV. figs. 1, 2.)

♂ ♀.—A near ally of *Ct. caucasica*, Taseh. (1880), but at once distinguished by the longer bristles of the hind tarsus and by the modified abdominal segments.

The pronotal comb contains fourteen spines. The longest apical bristle of the hind tibia extends to the apex of the first tarsal segment or beyond, the corresponding bristle of this segment reaching to the apex of the second segment, and the second segment has three apical bristles extending beyond the apex of the fourth. Several of the other bristles

of the hind tibia and hind tarsus also are longer than in *Ct. caucasica*.

The clasper (Cl) of the ♂ (fig. 1) is produced distally into a very long and straight process, P², which is longer than in any of the allied species. The dorsal apical angle of the clasper is rounded (P¹) and bears three long bristles and several small ones. The movable exopodite F is as large as in *Ct. caucasica*. Its ventral margin is distally somewhat concave. The ninth sternite (ix.st.) is less obtuse and bears more bristles than in *Ct. caucasica*. The seventh sternite of the ♀ (Pl. XIV. fig. 2, vii.st.) is bisinuate, the lower sinus being very shallow. The apex of the segment is divided by these excisions into three lobes, the ventral lobe hardly at all projecting, the second one being broad, short, and strongly rounded, and the third much narrower and longer than the second. The ventral row of bristles of the eighth sternite (viii.st.) ends with one short stout bristle.

A small series of both sexes from near Djarkent, Semitehenskoi, East Turkestan, November 25th and December 5th, 1912, off *Meriones tamaricinus*.

2. *Neopsylla teratura*, sp. n. (Pl. XIV. fig. 3.)

♂ ♀.—A very near relative of *N. bidentatiformis*, Wagn. (1893). The pronotum, in the ♂, bears on each side only 1 or 2 bristles in front of the postmedian row, and in the ♀ 4 or 5, instead of a more or less complete second row.

The eighth sternite of the ♂ has an apical brush of bristles, the long bristles being of nearly even width from the base to near the apex. The clasper (Cl) closely resembles that of *N. bidentatiformis*, but the process P² (fig. 3), as well as the movable process F, are narrower. The ninth sternite (ix.st.) has a very characteristic armature. The horizontal arm bears distally two rows of stout, short, spine-like bristles. One row is ventral and placed on the outer side, the other being situated along the centre of the inner surface. The ventral spines are strongly curved inwards and backwards, particularly the proximal ones. In *bidentatiformis*, of which Professor Wagner has kindly given us a ♂, there is only one row of spines, placed at the ventral margin, the spines being almost straight (fig. 4). The manubrium (M) of *teratura* is straight, with the extreme tip turned upwards. In the ♀ the apical margin of the seventh sternite is very slightly incurved, with the upper angle distinct but rounded. The eighth tergite bears a submarginal row of 8 bristles, the row being sometimes continued proximally by some small

bristles. Proximally to the row there are 7 to 12 bristles, and on the inner surface at and near the margin 9 to 12.

1 ♂ and 2 ♀ ♀ from near Djarkent, Semitchenskoi, East Turkestan, February 11th and 19th, 1912, off a white weasel and *Meriones tamaricinus*.

I am not convinced that Wagner was correct in sinking his *setosa* as a synonym of *bidentatiformis* (cf. Horv. Soc. Ent. Ross. vol. xxxvi. p. 143, 1902). The original specimens of *bidentatiformis*, Wagn. (1893), were found by Wagner in the Crimea on *Epinys decumanus*, the above-mentioned ♂ being one of these specimens. This example bears on the pronotum on each side a postmedian row of 8 long bristles, in front of this row another of 8 smaller ones, and dorsally some additional small bristles representing a third row. We figure the ninth sternite of this true *bidentatiformis* (fig. 4). A ♀, also received from Professor Wagner, obtained in the Northern Caucasus off *Spermophilus*, and identified by him as the same species, has a shorter pronotum, which, moreover, bears only one row of bristles, the second (anterior) row being only represented by a few pale dots, which are presumably the grooves of insertion of small hairs. The individual otherwise agrees fairly well with the ♀ ♀ described above as *teratura*. As Wagner states of *bidentatiformis*, as well as *setosa*, that the pronotum has only one row of bristles (6 on each side), and as the specimens subsequently identified by him as *bidentatiformis* came from different countries and hosts, a re-examination of the types appears advisable. Possibly *setosa* is the same as *teratura*.

In Proc. Zool. Soc. Lond. 1911, p. 387, we described as *Neopsylla compar* another species closely allied to *N. bidentatiformis*. In this species, however, the small hairs found in *bidentatiformis* and *teratura* on the inner surface of the hind coxa are, partly, replaced by short spines. The ♀ ♀ of *teratura* and *compar*, as well as the above-mentioned ♀ received from Wagner as *bidentatiformis*, do not exhibit any very striking differences in the seventh and eighth abdominal segments and the receptaculum seminis (cf. Proc. Zool. Soc. Lond. 1911, p. 387, text-fig. 120).

3. *Ceratophyllus curvispinus*, Miyaj. (1912).

Paradoxopsyllus curvispinus, Miyajima, ubi?

Ceratophyllus subcæcatus, Rothschild, in Clark and Sowerby, Through Shen-Kan, p. 194, no. 1, text-figs. 1, 2 (1912).

The author of *curvispinus* has very kindly sent several examples of this species, which proves to be the same as my

subcæcatus. The description of *subcæcatus* was already printed when the specimens of *curvispinus* arrived, but the book in which the description appeared was only issued in the second half of 1912.

Although *curvispinus* is very remarkable on account of the peculiar development of the ninth abdominal sternite of the ♂, the species fits very well into *Ceratophyllus* as at present composed. If the genus *Ceratophyllus*, however, should require dividing up into a number of separate genera, *Paradoxopsyllus* will probably be one of them.

The two following species are so similar to *curvispinus* that a lengthy description is not necessary:—

4. *Ceratophyllus teretifrons*, sp. n. (Pl. XV. fig. 5.)

♂ ♀.—The frons has no tubercle in either sex, whereas a distinct frontal tubercle is present in both *curvispinus* and in the new species described under no. 5. There are two rows of bristles on the frons, the anterior row containing in the ♂ 5 or 6 and in the ♀ 4 or 5 bristles, the second row 3 large bristles in both ♂ and ♀. The occiput bears 2 or 3 bristles above the centre of the antennal groove, and in the ♂ 10 or more small hairs along the antennal groove. The long apical dorsal and ventral bristles of the hind tibia reach to the apex of the first tarsal segment, and the second segment has in both sexes two apical bristles extending beyond the fourth segment, these bristles being particularly long in the ♂. In the ♂ of *curvispinus* a subapical dorsal bristle of the second hind-tarsal segment also is much prolonged, which is not the case in *C. teretifrons*. The first mid-tarsal segment is at least one-eighth longer than the second.

In the ♂ of *teretifrons* (fig. 5) the eighth abdominal tergite only bears four long bristles, there being no patch of bristles on the sides, and the eighth sternite has on each side 3 or 4 bristles. The apical process P of the clasper is triangular, not truncate. The movable process F is longer than in *curvispinus*, its longest bristle being placed nearer the apex and its posterior edge bearing 6 to 8 thin hairs. The ninth sternite has the same peculiar shape as in *curvispinus*, but its ventral arm differs in being less abruptly widened in the centre and having here two slender bristles proximally to the two long ones, instead of their being short and spiniform. The apical hook of the penis is shorter and less slender than in *curvispinus*.

The modified abdominal segments of the ♀ do not present any reliable difference from the allied species, the outline and bristles of the eighth tergite being individually variable.

A series of both sexes from near Djarkent, Semitchenskoi, East Turkestan, October 15th and November 15th, 1912, off *Meriones tamaricus*.

5. *Ceratophyllus repandus*, sp. n. (Pl. XV. figs. 6, 9.)

♂ ♀.—The frons has in both sexes a distinct tubercle. The bristles of the head and legs are similar to those of *C. teretifrons*, but the anterior row of the frons contains one or two bristles less.

The clasper resembles that of *teretifrons*, but the finger is a little shorter and bears fewer bristles at the posterior margin, the interspace between the longest bristle and the next below it being wider than in *teretifrons*. The widened central portion of the ventral arm of the ninth sternite (fig. 6) is more gradually dilated, and the bristles it bears are much less prolonged. There are in this place four bristles, the first being the shortest and thinnest and the other gradually increasing in length. The ventral angle of the dilated apex of this segment is rounded, and not triangular as in the two preceding species, and the apical hook of the penis is much broader, shorter, and more obtuse than in *curvispinus* and *teretifrons*.

The seventh and eighth abdominal segments of the ♀ (fig. 9) are apparently indistinguishable from those of *teretifrons*. The stylet, however, is half as long again in *teretifrons* as in *repandus*, being in *teretifrons* as long as the fourth hind-tarsal segment.

A series of both sexes from near Djarkent, Semitchenskoi, East Turkestan, October 5th, 1912, off *Meriones tamaricus*.

6. *Ceratophyllus consors*, sp. n. (Pl. XV. figs. 7, 8.)

♂ ♀.—A near ally of *C. henleyi*, Roths. (1904), and *maurus*, Jord. & Roths. (1912), the apical bristles of the hind-tarsal segments being long and the dorsal ones of the meso- and metanota and proximal abdominal tergites forming in the ♂ a kind of mane. Two of the apical bristles of the second segment of the hind tarsus extend considerably beyond the apex of the fourth segment, being somewhat longer than in *henleyi* and *maurus*. *C. consors*, however, is more easily differentiated by the modified abdominal segments.

In the ♂ the eighth abdominal tergite (Pl. XV. fig. 7,

VIII.t.) bears many more bristles than in the allied species, and is also more strongly produced posteriorly. In the clasper and its two processes, P and F, *C. consors* agrees rather closely with *C. henleyi*; but P is broader in *consors*, and the proximal edge of F is not angulate. The ninth sternite (IX.st.), however, is decidedly narrower distally than in *C. henleyi*. The seventh sternite of the ♀ (Pl. XV. fig. 8) is obliquely sinuate, the lobe below the sinus being much produced and rounded, except ventrally, while the lobe above the sinus is usually narrow and pointed. This upper lobe varies greatly in length, being sometimes very short and rounded.

A long series of both sexes from Djarkent, Semitchenskoi, East Turkestan, October 15th, 1912, off *Meriones tamaricinus*.

EXPLANATION OF THE PLATES.

PLATE XIV.

- Fig. 1.* Clasping-organs of ♂ of *Ctenophthalmus dolichus*, sp. n. Cl, clasper; P¹ and P², upper and lower processes of same; F, movable process; VIII.st. and IX.st., eighth and ninth sternites.
Fig. 2. Seventh and eighth abdominal segments of ♀ of *Ctenophthalmus dolichus*.
Fig. 3. Clasping-organs of ♂ of *Neopsylla teratura*, sp. n.
Fig. 4. Ventral arm of ninth sternite of ♂ of *Neopsylla bidentatiformis*, Wagn. (1893).

PLATE XV.

- Fig. 5.* Clasping-organs of ♂ of *Ceratophyllus teretifrons*, sp. n.
Fig. 6. Ninth sternite and apex of penis of ♂ of *Ceratophyllus repandus*, sp. n.
Fig. 7. Clasping-organs of ♂ of *Ceratophyllus consors*, sp. n.
Fig. 8. Seventh and eighth abdominal segments of ♀ of *Ceratophyllus consors*, sp. n.
Fig. 9. Seventh and eighth abdominal segments of ♀ of *Ceratophyllus repandus*, sp. n.

LXVII.—*Notes on the South-American Freshwater Flying-fish, Gastropelecus, and the common Flying-fish, Exocætus.*
 By W. G. RIDEWOOD.

[Plate XVI.]

ALTHOUGH less popularly known than the common flying-fish, *Exocætus*, the flying gurnard, *Dactylopterus*, and the African freshwater flying-fish, *Pantodon*, the freshwater flying-fish of Guiana, *Gastropelecus*, may ultimately prove to have a better